

Mock Set A – Paper 1

Solutions

For Pearson Edexcel GCSE Mathematics (1MA1)

Foundation tier • Paper 1 (Non-Calculator)

Each question is shown in grey, followed by the working, one step per line. The final answer is in a box. *Marks* shows how the marks are usually given in the exam, and **Tip** points out a common mistake.

1 (1 mark)

Write 43% as a decimal.

43% means 43 out of 100.

$$43 \div 100 = 0.43$$

Answer: 0.43

Tip: To change a percentage to a decimal, divide by 100. 43% is not 4.3 or 0.043.

2 (1 mark)

Write down the value of the 8 in the number 58 304

Place value: 5 ten thousands, 8 thousands, 3 hundreds, 0 tens, 4 ones.

The 8 is in the thousands column, so its value is 8000.

Answer: 8000 (eight thousand)

3 (1 mark)

Simplify $2 \times w \times 7$

Multiply the numbers: $2 \times 7 = 14$

Write the number in front of the letter: $14w$

Answer: $14w$

4 (1 mark)

Change 7 kg into grams.

$$1 \text{ kg} = 1000 \text{ g}$$

$$7 \times 1000 = 7000$$

Answer: 7000 grams

5 (1 mark)

Find the square root of 81

$$9 \times 9 = 81$$

$$\text{So } \sqrt{81} = 9$$

Answer: 9

Tip: The square root is the number that multiplies by itself to give 81. It is not half of 81.

6 (4 marks)

Here is a price list at a garden centre.

Garden centre	
Packet of seeds	£1.35 each
Plant pots	3 for £1.25
Watering can	£6.49

Rosie buys

4 packets of seeds

12 plant pots

1 watering can.

She pays with two £10 notes.

Work out how much change Rosie should get.

Seeds: $4 \times £1.35 = £5.40$

Plant pots: $12 \div 3 = 4$ packs of 3

$4 \times £1.25 = £5.00$

Total cost: $£5.40 + £5.00 + £6.49 = £16.89$

She pays $2 \times £10 = £20$

Change: $£20 - £16.89 = £3.11$

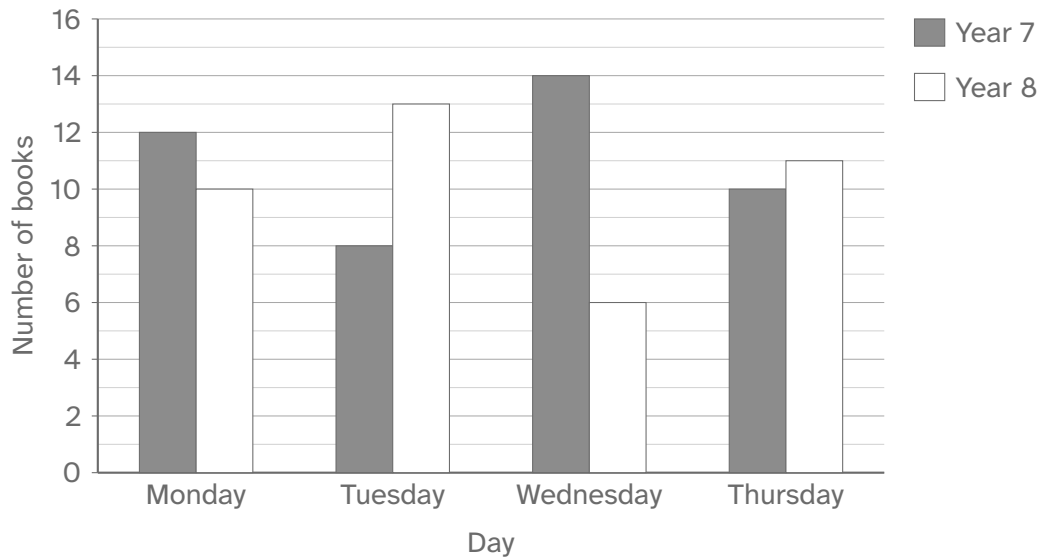
Answer: £3.11

Tip: The pots are sold 3 for £1.25, so 12 pots cost $4 \times £1.25$, not $12 \times £1.25$.

Marks: 1 mark for the cost of the seeds or the pots. 1 mark for adding all three costs. 1 mark for taking the total away from £20. 1 mark for £3.11.

7 (3 marks)

The dual bar chart shows the number of library books borrowed by students in Year 7 and in Year 8 on four days last week.



- (a) How many books did Year 8 borrow on Tuesday?

Year 8 has the white bars.

The white bar for Tuesday reaches 13.

Answer: 13

- (b) Megan says,
"Altogether, Year 7 borrowed more books than Year 8 on these four days."
Is Megan correct?
You must show how you get your answer.

Year 7 (shaded bars): $12 + 8 + 14 + 10 = 44$

Year 8 (white bars): $10 + 13 + 6 + 11 = 40$

44 is more than 40, so Year 7 borrowed more books altogether.

Yes, Megan is correct.

Answer: Yes: Year 7 borrowed 44 books and Year 8 borrowed 40 books.

Tip: Do not decide from the tallest bar or from the number of days each year “wins” (2 days each). Add up all four bars for each year.

Marks: 1 mark for adding the four bars for one year (44 or 40). 1 mark for “yes” with both totals.

8 (3 marks)

OA , OB , OC and OD are four straight lines.

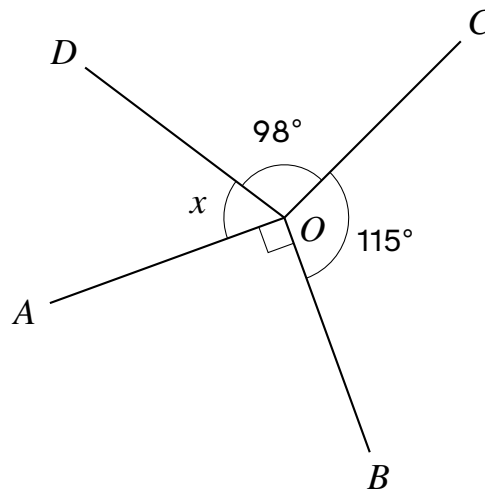


Diagram **NOT** accurately drawn

(i) Work out the size of the angle marked x .

The angles around the point O add up to 360° .

$$90 + 115 + 98 = 303$$

$$x = 360 - 303 = 57$$

Answer: 57°

Tip: The square corner means 90° . Remember to include it when you add the angles.

Marks: 1 mark for $360 - (90 + 115 + 98)$. 1 mark for 57.

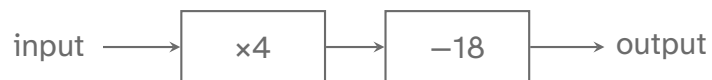
- (ii) Give a reason for your answer.

Angles around a point add up to 360° .

Answer: Angles at a point add up to 360° .

9 (3 marks)

Here is a number machine.



- (a) Work out the output when the input is 8

$$8 \times 4 = 32$$

$$32 - 18 = 14$$

Answer: 14

- (b) Work out the input when the output is -6

Work backwards using the inverse operations.

The inverse of -18 is $+18$: $-6 + 18 = 12$

The inverse of $\times 4$ is $\div 4$: $12 \div 4 = 3$

Check: $3 \times 4 - 18 = 12 - 18 = -6$ ✓

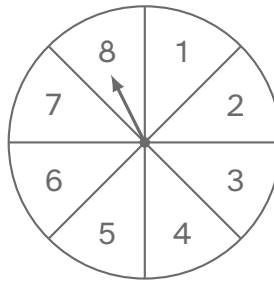
Answer: 3

Tip: Undo the machine in reverse order: add 18 first, then divide by 4.

Marks: 1 mark for $-6 + 18$ or for using $\div 4$. 1 mark for 3.

10 (2 marks)

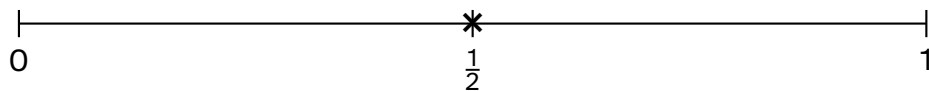
Ella has a fair 8-sided spinner.
She spins the spinner once.



- (a) On the probability scale, mark with a cross (×) the probability that the spinner lands on an even number.

Even numbers: 2, 4, 6, 8, so 4 out of 8.

$$P(\text{even}) = \frac{4}{8} = \frac{1}{2}$$



Answer: Cross at $\frac{1}{2}$

- (b) Omar says,
“The probability that the spinner lands on a factor of 12 is more than $\frac{1}{2}$ ”
Is Omar correct?
Give a reason for your answer.

The factors of 12 are 1, 2, 3, 4, 6 and 12.

The factors of 12 on the spinner are 1, 2, 3, 4 and 6. That is 5 of the 8 numbers.

$$P(\text{factor of 12}) = \frac{5}{8}, \text{ and } \frac{1}{2} = \frac{4}{8}$$

$\frac{5}{8}$ is more than $\frac{4}{8}$, so Omar is correct.

Answer: Yes: 1, 2, 3, 4 and 6 are factors of 12, so the probability is $\frac{5}{8}$, which is more than $\frac{1}{2}$ ($= \frac{4}{8}$).

Tip: Remember that 1 is a factor of every number. Missing it gives $\frac{4}{8} = \frac{1}{2}$, which is not more than $\frac{1}{2}$.

11 (4 marks)

- (a) Work out an estimate for the value of $\frac{57.8 \times 3.7}{0.21}$

Round each number to 1 significant figure.

$$57.8 \approx 60, 3.7 \approx 4, 0.21 \approx 0.2$$

$$\frac{60 \times 4}{0.2} = \frac{240}{0.2}$$

$$240 \div 0.2 = 2400 \div 2 = 1200$$

Answer: 1200

Tip: Dividing by 0.2 makes the answer bigger. Multiply the top and bottom by 10:
 $240 \div 0.2 = 2400 \div 2$.

Marks: 1 mark for rounding at least two of the numbers correctly. 1 mark for 1200.

- (b) Is your answer to part (a) an underestimate or an overestimate?
Give a reason for your answer.

57.8 and 3.7 were both rounded **up**, so the top of the fraction is too big.

0.21 was rounded **down**, so you are dividing by a number that is too small.

Both changes make the answer bigger.

So 1200 is an overestimate.

Answer: Overestimate: 57.8 and 3.7 were rounded up and 0.21 was rounded down.

Tip: Dividing by a smaller number gives a bigger answer. Rounding the bottom of a fraction down makes the estimate too big.

(c) Given that $5.6 \times 1.3 = 7.28$

Write down the value of 560×13

$$560 = 5.6 \times 100 \text{ and } 13 = 1.3 \times 10$$

$$\text{So the answer is } 7.28 \times 100 \times 10 = 7.28 \times 1000$$

$$= 7280$$

Answer: 7280

Tip: Use the fact you are given. You do not need to multiply from scratch.

12 (4 marks)

(a) Work out $\frac{7}{10} - \frac{1}{6}$

Give your answer as a fraction in its simplest form.

A common denominator of 10 and 6 is 30.

$$\frac{7}{10} = \frac{21}{30} \text{ and } \frac{1}{6} = \frac{5}{30}$$

$$\frac{21}{30} - \frac{5}{30} = \frac{16}{30}$$

Divide top and bottom by 2: $\frac{16}{30} = \frac{8}{15}$

Answer: $\frac{8}{15}$

Tip: Do not subtract the tops and the bottoms separately: $\frac{7-1}{10-6}$ is wrong.

Marks: 1 mark for writing both fractions over a common denominator. 1 mark for $\frac{8}{15}$.

(b) Show that $\frac{5}{12} \times \frac{8}{15} = \frac{2}{9}$

Multiply the numerators and multiply the denominators.

$$\frac{5}{12} \times \frac{8}{15} = \frac{5 \times 8}{12 \times 15} = \frac{40}{180}$$

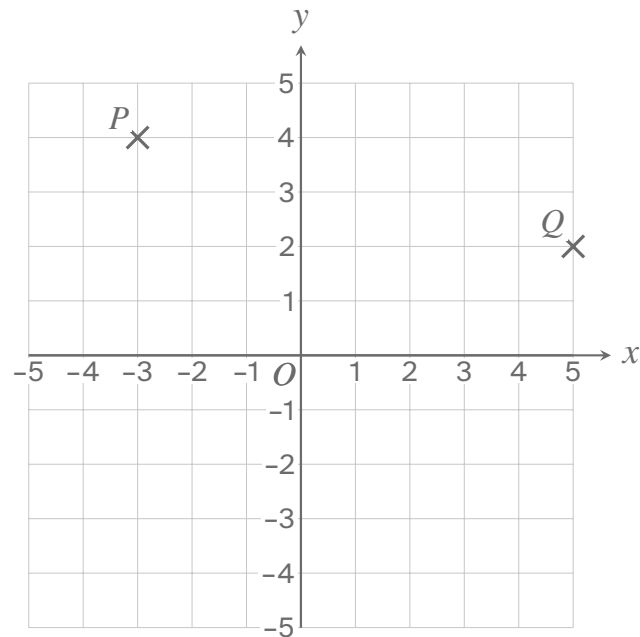
Divide top and bottom by 20: $\frac{40}{180} = \frac{2}{9}$

Answer: $\frac{40}{180} = \frac{2}{9}$

Marks: 1 mark for $\frac{40}{180}$ (or for cancelling first). 1 mark for showing it simplifies to $\frac{2}{9}$.

13 (2 marks)

The points P and Q are shown on the grid.



- (a) Write down the coordinates of the point P .

Go across first, then up.

P is 3 to the left and 4 up.

Answer: $(-3, 4)$

Tip: Write the x -coordinate first. $(4, -3)$ is a different point.

- (b) Find the coordinates of the midpoint of PQ .

$$P = (-3, 4) \text{ and } Q = (5, 2)$$

$$x: \frac{-3 + 5}{2} = \frac{2}{2} = 1$$

$$y: \frac{4 + 2}{2} = \frac{6}{2} = 3$$

Answer: $(1, 3)$

14 (3 marks)

Tickets for a wildlife park are booked online.

An adult ticket costs £16

A child ticket costs £9

There is a booking fee of £1.50 for each booking.

Sam books a adult tickets and c child tickets in one booking.

The total cost of the booking is £ T .

Write a formula for T in terms of a and c .

Adult tickets cost $16 \times a = 16a$ pounds.

Child tickets cost $9 \times c = 9c$ pounds.

Add the booking fee of £1.50 once.

$$T = 16a + 9c + 1.5$$

Answer: $T = 16a + 9c + 1.5$

Tip: A formula needs " $T =$ " at the start. Do not add the 16 and 9 to get $25ac$.

Marks: 3 marks for $T = 16a + 9c + 1.5$. 2 marks for $16a + 9c + 1.5$ without $T =$. 1 mark for $16a$ or $9c$.

15 (4 marks)

A gardener plants 240 bulbs in a park.

$\frac{1}{4}$ of the bulbs are red.

20% of the rest of the bulbs are yellow.

The remaining bulbs are white or purple.

There are the same number of white bulbs as purple bulbs.

What percentage of the 240 bulbs are white?

Red: $\frac{1}{4}$ of 240 = $240 \div 4 = 60$

The rest: $240 - 60 = 180$

Yellow: 20% of 180. 10% is 18, so 20% is 36

White and purple: $180 - 36 = 144$

White: $144 \div 2 = 72$

Percentage white: $\frac{72}{240} \times 100 = \frac{3}{10} \times 100 = 30\%$

Answer: 30%

Tip: The 20% is of the **rest** of the bulbs (180), not of all 240 bulbs.

Marks: 1 mark for 180 (the rest). 1 mark for 36 or 144. 1 mark for a complete method for the percentage. 1 mark for 30.

16 (3 marks)

Work out 6.7×4.8

Work out 67×48 without the decimal points.

$$67 \times 40 = 2680$$

$$67 \times 8 = 536$$

$$2680 + 536 = 3216$$

There are 2 decimal places in the question (6.7 and 4.8), so the answer has 2 decimal places.

32.16

Check: $7 \times 5 = 35$, so about 32 is sensible.

Answer: 32.16

Tip: Estimate first ($7 \times 5 = 35$) so you can check where the decimal point goes.

Marks: 1 mark for a complete method (eg a grid or long multiplication). 1 mark for the digits 3216. 1 mark for the decimal point in the right place.

17 (5 marks)

120 people went to a leisure centre one day.

Each person was a member or a non-member.

Each person went to a morning session or to an evening session.

75 of the people were members.

$\frac{2}{5}$ of the members went to an evening session.

48 of the people went to an evening session.

(a) Use this information to complete the frequency tree.

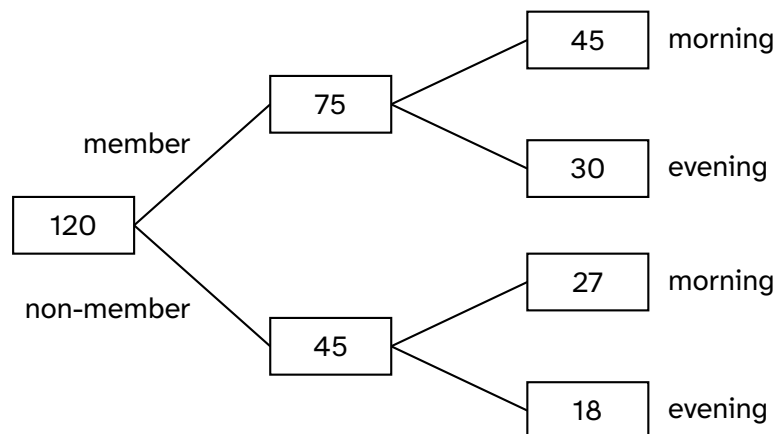
Members: 75. Non-members: $120 - 75 = 45$

Members, evening: $\frac{2}{5}$ of 75 = $75 \div 5 \times 2 = 30$

Members, morning: $75 - 30 = 45$

Non-members, evening: $48 - 30 = 18$

Non-members, morning: $45 - 18 = 27$



Answer: 75, 45; 45, 30; 27, 18

Tip: The 48 evening visitors include members **and** non-members. Take away the 30 members to find the non-members in the evening.

Marks: 3 marks for a fully correct tree. 2 marks for 4 or 5 correct numbers. 1 mark for 2 or 3 correct numbers.

(b) One of the 120 people is chosen at random.

Find the probability that this person is a non-member who went to a morning session.

Non-members who went in the morning: 27

There are 120 people altogether.

$$P = \frac{27}{120} \left(= \frac{9}{40} \right)$$

Answer: $\frac{27}{120} \left(= \frac{9}{40} \right)$

Tip: Choose from all 120 people, not just the 45 non-members.

Marks: 1 mark for a fraction with 120 on the bottom (or 27 on top). 1 mark for $\frac{27}{120}$ or an equivalent.

18 (2 marks)

Here are the ingredients for making 12 cheese muffins.

Ingredients for 12 cheese muffins

240 g self-raising flour

90 g grated cheese

50 g butter

150 ml milk

2 eggs

Priya wants to make 30 cheese muffins.

Work out how much grated cheese she needs.

$30 \div 12 = 2.5$, so she needs 2.5 times as much.

$90 \times 2 = 180$ and half of 90 is 45

$$180 + 45 = 225$$

Answer: 225 g

Tip: 30 muffins is $2\frac{1}{2}$ times the recipe. You can also find the cheese for 6 muffins (45 g) and multiply by 5.

Marks: 1 mark for a correct method, eg $90 \div 12 \times 30$ or 90×2.5 . 1 mark for 225.

19 (4 marks)

- (a) Write 396 as a product of its prime factors.

Divide by prime numbers.

$$396 = 2 \times 198$$

$$198 = 2 \times 99$$

$$99 = 3 \times 33$$

$$33 = 3 \times 11$$

$$396 = 2 \times 2 \times 3 \times 3 \times 11 = 2^2 \times 3^2 \times 11$$

Answer: $2 \times 2 \times 3 \times 3 \times 11$ ($= 2^2 \times 3^2 \times 11$)

Tip: Make sure every number at the end of your factor tree is prime, and write them as a product (with $\times$ signs), not a list.

Marks: 1 mark for at least two correct steps (eg in a factor tree). 1 mark for the full product.

- (b) Find the highest common factor (HCF) of 396 and 540

$$396 = 2^2 \times 3^2 \times 11$$

$$540 = 2 \times 270 = 2 \times 2 \times 135 = 2 \times 2 \times 3 \times 45 = 2^2 \times 3^3 \times 5$$

Common prime factors: $2 \times 2 \times 3 \times 3$

$$\text{HCF} = 4 \times 9 = 36$$

Answer: 36

Tip: The HCF is the biggest number that divides into both. Do not give the LCM, or just a common factor like 4 or 12.

Marks: 1 mark for 540 as a product of primes (or for listing factors of both numbers). 1 mark for 36.

20 (3 marks)

$ABCDEFGH$ is a regular octagon.

ABT is an equilateral triangle.

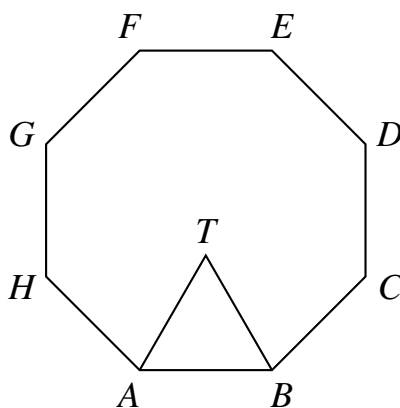


Diagram **NOT** accurately drawn

Work out the size of angle HAT .

You must show all your working.

Exterior angle of a regular octagon: $360 \div 8 = 45^\circ$

Interior angle: $180 - 45 = 135^\circ$, so angle $HAB = 135^\circ$

Triangle ABT is equilateral, so angle $TAB = 60^\circ$

Angle $HAT = 135 - 60 = 75^\circ$

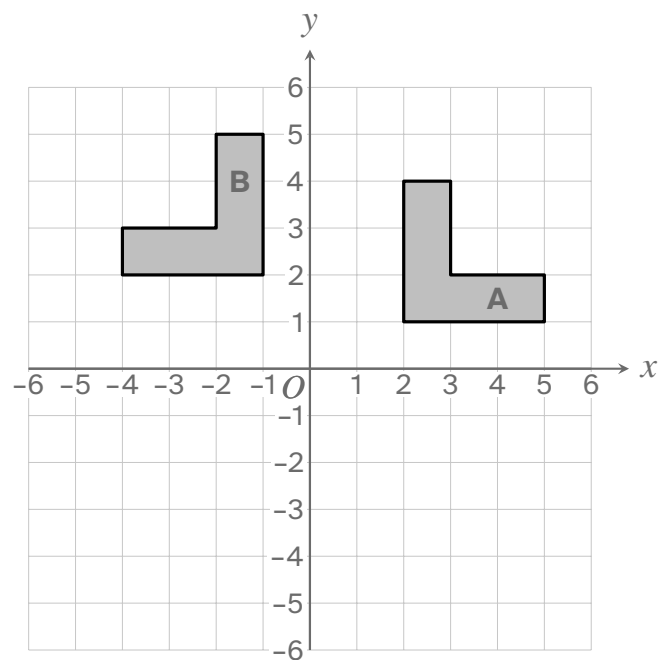
Answer: 75°

Tip: $360 \div 8 = 45$ is the **exterior** angle. The interior angle is $180 - 45 = 135$.

Marks: 1 mark for the interior angle of the octagon (135). 1 mark for $135 - 60$. 1 mark for 75.

21 (2 marks)

Shape A and shape B are drawn on the grid.



Describe fully the single transformation that maps shape A onto shape B .

Shape B is the same size and shape as A , but turned. So it is a rotation.

Trace shape A and turn the tracing about $(0,0)$.

A quarter turn anticlockwise moves A onto B : the corner $(2,1)$ goes to $(-1,2)$.

Rotation, 90° anticlockwise, centre (0, 0)

Answer: Rotation 90° anticlockwise about (0, 0)

Tip: For a rotation, give all three details: the word rotation, the angle and direction, and the centre. Turn, spin or twist do not get the marks.

Marks: 2 marks for rotation, 90° anticlockwise, centre (0, 0). 1 mark for rotation with one of the other two details.

22 (5 marks)

A youth club has 140 members.

Each member is a junior or a senior.

number of juniors : number of seniors = 4:3

$\frac{3}{8}$ of the juniors go on a summer trip.

45% of the seniors go on the summer trip.

How many of the 140 members do **not** go on the summer trip?

You must show all your working.

Total parts: $4 + 3 = 7$

One part: $140 \div 7 = 20$

Juniors: $4 \times 20 = 80$. Seniors: $3 \times 20 = 60$

Juniors on the trip: $\frac{3}{8}$ of 80 = $80 \div 8 \times 3 = 30$

Seniors on the trip: 45% of 60. 10% = 6, 5% = 3, so 45% = $24 + 3 = 27$

Members on the trip: $30 + 27 = 57$

Not on the trip: $140 - 57 = 83$

Answer: 83

Tip: Read the question again at the end: it asks for the members who do **not** go. 57 is the number who do go.

Marks: 1 mark for 80 or 60. 1 mark for 30 juniors (or 50). 1 mark for 27 seniors (or 33). 1 mark for $140 - (30 + 27)$ or $50 + 33$. 1 mark for 83.

23 (2 marks)

Zara was asked to write $7^6 \times 7^3 \div 7^4$ as a single power of 7
Here is her working.

$$7^6 \times 7^3 = 7^{18}$$

$$7^{18} \div 7^4 = 7^{14}$$

Zara's answer is wrong.

- (a) Explain what is wrong with Zara's method.

$7^6 \times 7^3$ means six 7s multiplied by three more 7s: that is nine 7s, so 7^9 .

Zara multiplied the powers ($6 \times 3 = 18$). When you multiply powers of the same number you should **add** the powers.

Answer: She multiplied the powers 6 and 3 instead of adding them ($7^6 \times 7^3 = 7^9$, not 7^{18}).

Tip: Her second line is right for her first line: dividing does mean subtracting the powers. The mistake is in the first line.

- (b) Work out the correct answer.

Give your answer as a power of 7

Multiply: add the powers. $7^6 \times 7^3 = 7^{6+3} = 7^9$

Divide: subtract the powers. $7^9 \div 7^4 = 7^{9-4} = 7^5$

Answer: 7^5

Tip: Add the powers when multiplying and subtract them when dividing: $6 + 3 - 4 = 5$.

24 (3 marks)

- (a) Write 4.7×10^{-3} as an ordinary number.

10^{-3} means divide by 1000.

$$4.7 \div 1000 = 0.0047$$

Answer: 0.0047

Tip: A negative power of 10 gives a small number. Move the digits 3 places to the right (or the decimal point 3 places left).

- (b) Work out $(4 \times 10^5) \times (7 \times 10^3)$
Give your answer in standard form.

Multiply the numbers: $4 \times 7 = 28$

Multiply the powers of 10: $10^5 \times 10^3 = 10^8$

28×10^8 is not in standard form, because 28 is bigger than 10.

$28 = 2.8 \times 10$, so $28 \times 10^8 = 2.8 \times 10^9$

Answer: 2.8×10^9

Tip: Check the first number is between 1 and 10. 28×10^8 is the right value but not in standard form.

Marks: 1 mark for 28×10^8 or 2 800 000 000. 1 mark for 2.8×10^9 .

25 (3 marks)

In a sale, all the normal prices in a sports shop are reduced by 35%.

Ravi buys a pair of football boots in the sale.

He pays £52 for the boots.

How much money does Ravi save by buying the boots in the sale?

The sale price is $100\% - 35\% = 65\%$ of the normal price.

$65\% = £52$

65% is 13 lots of 5%, so $5\% = 52 \div 13 = £4$

Normal price: $100\% = 4 \times 20 = £80$

Saving: $£80 - £52 = £28$ (or $35\% = 7 \times £4 = £28$)

Check: 35% of £80 is £28, and $£80 - £28 = £52$ ✓

Answer: £28

Tip: £52 is 65% of the normal price, not 100%. Finding 35% of £52 (£18.20) is the most common wrong answer.

Marks: 1 mark for a start on the normal price, eg $52 \div 0.65$ or $5\% = £4$. 1 mark for a complete method for the saving, eg $80 - 52$. 1 mark for £28.

26 (6 marks)

(a) Complete the table of values for $y = x^2 + 2x - 4$

x	-4	-3	-2	-1	0	1	2
y	4	-1	-4	-5	-4	-1	4

Substitute each value of x into $y = x^2 + 2x - 4$.

$$x = -3: (-3)^2 + 2 \times (-3) - 4 = 9 - 6 - 4 = -1$$

$$x = -1: (-1)^2 + 2 \times (-1) - 4 = 1 - 2 - 4 = -5$$

$$x = 0: 0 + 0 - 4 = -4$$

$$x = 2: 4 + 4 - 4 = 4$$

Check: the y -values are symmetrical about $x = -1$.

Answer: -1, -5, -4, 4

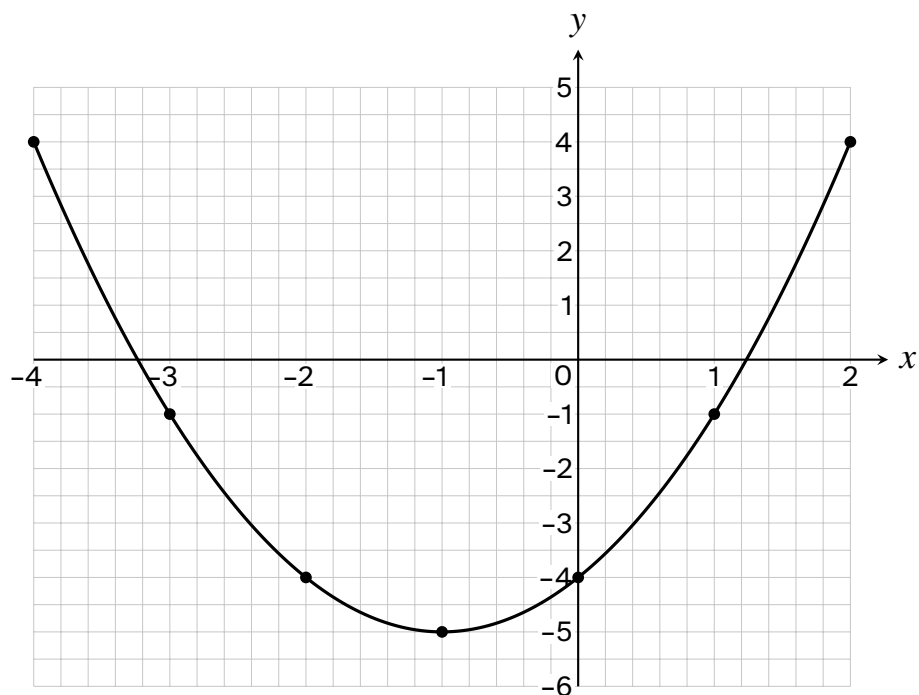
Tip: $(-3)^2 = 9$, not -9 . Use brackets when you square a negative number.

Marks: 2 marks for all four correct. 1 mark for two or three correct.

(b) On the grid, draw the graph of $y = x^2 + 2x - 4$ for values of x from -4 to 2

Plot the seven points from the table.

Join them with a smooth curve.



Answer: Smooth U-shaped curve through $(-4, 4)$, $(-3, -1)$, $(-2, -4)$, $(-1, -5)$, $(0, -4)$, $(1, -1)$, $(2, 4)$

Tip: Draw one smooth curve. Do not join the points with straight lines, and keep the bottom of the curve rounded at $(-1, -5)$.

Marks: 1 mark for plotting at least 6 points correctly. 1 mark for a smooth curve through all the points.

- (c) Use the graph to find estimates of the solutions of $x^2 + 2x - 4 = 0$

The solutions of $x^2 + 2x - 4 = 0$ are where $y = 0$.

So read off where the curve crosses the x -axis.

$x \approx -3.2$ and $x \approx 1.2$

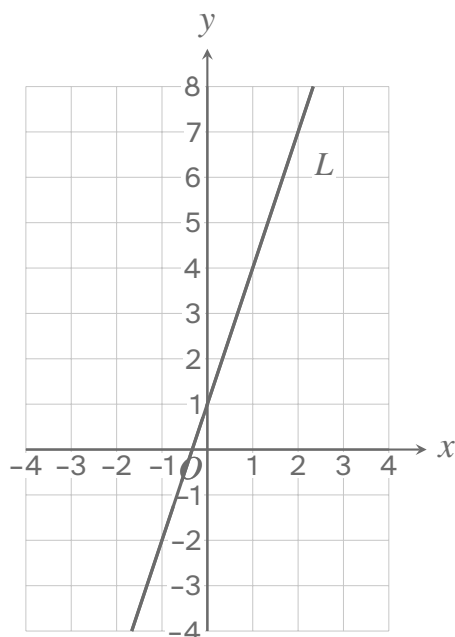
Answer: $x \approx -3.2$ and $x \approx 1.2$

Tip: There are two solutions, one on each side of the turning point. Give both.

Marks: 1 mark for each value.

27 (4 marks)

The straight line L is drawn on the grid.



- (a) Find an equation for L .

L crosses the y -axis at $(0, 1)$, so $c = 1$.

Choose two points on L , eg $(0, 1)$ and $(2, 7)$.

$$\text{Gradient} = \frac{\text{change in } y}{\text{change in } x} = \frac{7 - 1}{2 - 0} = \frac{6}{2} = 3, \text{ so } m = 3$$

$$y = mx + c \text{ gives } y = 3x + 1$$

Answer: $y = 3x + 1$

Tip: Count the squares carefully: for every 1 across, the line goes 3 up. Write a full equation starting with $y =$, not just the gradient and the intercept.

Marks: 1 mark for the gradient 3. 1 mark for $y = 3x + c$ or $y = mx + 1$. 1 mark for $y = 3x + 1$.

- (b) The point P has coordinates $(20, 62)$

Does P lie on the line L ?

You must show how you get your answer.

Substitute $x = 20$ into $y = 3x + 1$:

$$y = 3 \times 20 + 1 = 61$$

On L , the point with $x = 20$ has $y = 61$, not 62.

No, P does not lie on L .

Answer: No: when $x = 20$, $y = 3 \times 20 + 1 = 61$, not 62.

Tip: The grid is too small to show $(20, 62)$, so use your equation. Substitute $x = 20$ and compare with $y = 62$.

28 (1 mark)

Write down the exact value of $\tan 45^\circ$

In a right-angled isosceles triangle the two angles are 45° and the two shorter sides are equal.

$$\tan 45^\circ = \frac{\text{opposite}}{\text{adjacent}} = \frac{1}{1} = 1$$

Answer: 1

Tip: Learn the exact values: $\tan 0^\circ = 0$, $\tan 30^\circ = \frac{1}{\sqrt{3}}$, $\tan 45^\circ = 1$, $\tan 60^\circ = \sqrt{3}$.
